



Trailblazer

A Federation for Joint Experimentation



High Level Architecture

Defense Modeling & Simulation Office
(703) 998-0660 Fax (703) 998-0667
hla@msis.dmsso.mil
<http://www.dmsso.mil/>

US Atlantic Command Joint Experimentation
Directorate / Modeling & Simulation Division (J951)
(757) 686-7630 Fax (703) 686-0667
<http://www.jwfc.acom.mil/>

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Background

- **Trailblazer/Pegasus represents the continuing evolution of DMSO's interest in supporting the M&S requirements for Joint Experimentation**
- **Program initiated in FY98 as part of DDR&E-sponsored "Joint Warfighting Program" (JWP)**
 - **Intended to improve the information superiority of US military forces through the exploration and co-evolution of technologies, doctrine and organizations**
 - **DDR&E identified DMSO as the agent for JWP M&S**
- **In FY98 DMSO**
 - **developed a working example of the application of DoD standards and infrastructure to JV2010 experimentation**
 - **conducted a "Trailblazer" activity to rapidly execute the end-to-end process of using HLA federations to an example experiment.**



Trailblazer Objectives

- **DMSO objective:**
 - Explore the use of federations in experimentation arena
 - Capture lessons learned to improve application of M&S
- **Specific guidance:**
 - Use the High Level Architecture
 - Distribute development at federate home sites
 - Conduct integration and execution at single site in DC area
 - Operate at a classified, but no higher than collateral SECRET, level
 - Complete development within fixed budget and schedule (<5 months)
 - Consider closed loop, faster-than real time simulations

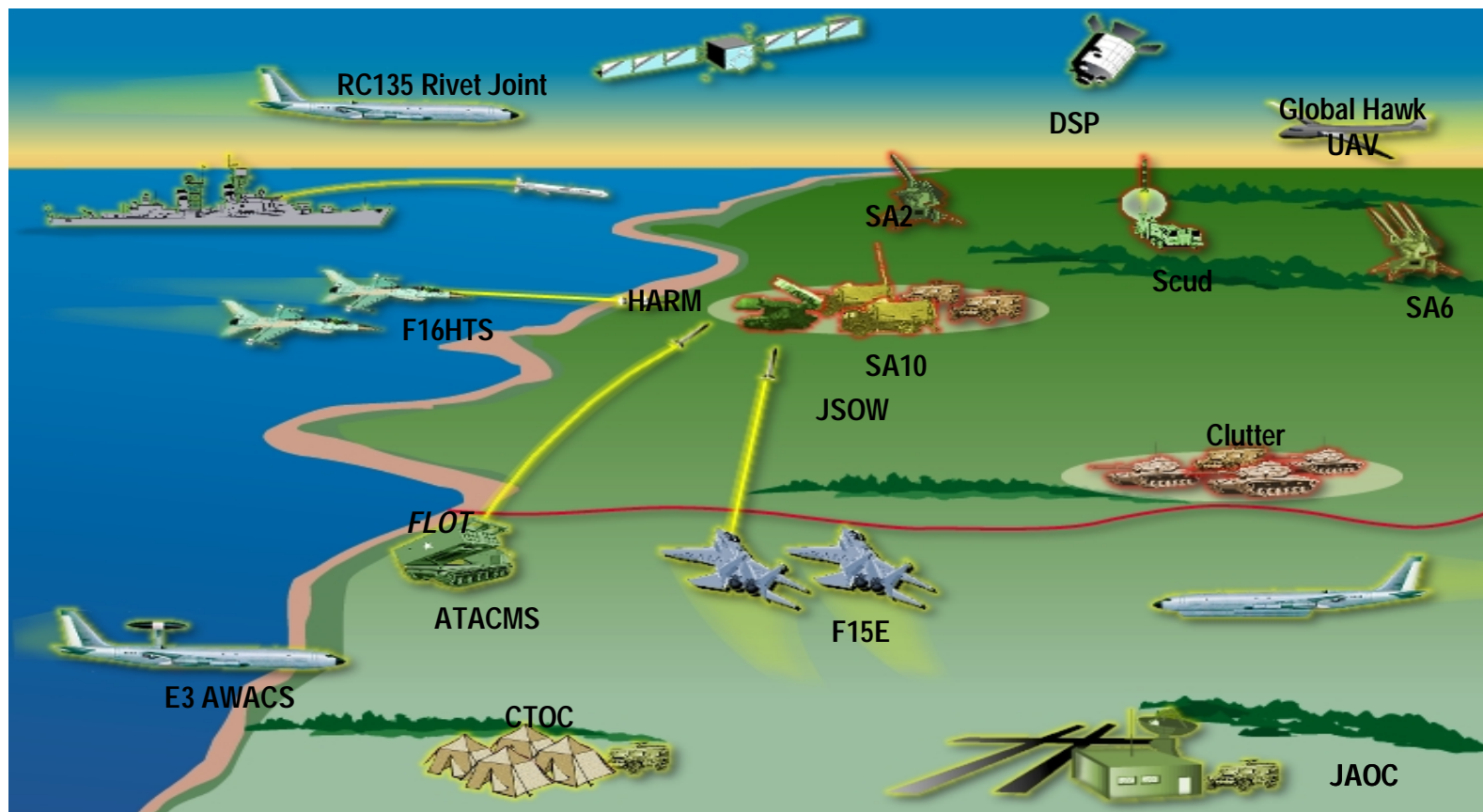
FEDEP Overview

Define Federation Objectives	Develop Federation Conceptual Model	Design and Develop Federation	Integrate and Test Federation	Execute Federation and Analyze Results
Identify Sponsor Needs Develop Objectives	Develop Scenario Perform Conceptual Analysis Develop Federation Requirements	Design Federation Develop Federation	Plan Execution Integrate Federation Test Federation	Execute Federation Analyze Results Prepare Feedback

Trailblazer Battlespace

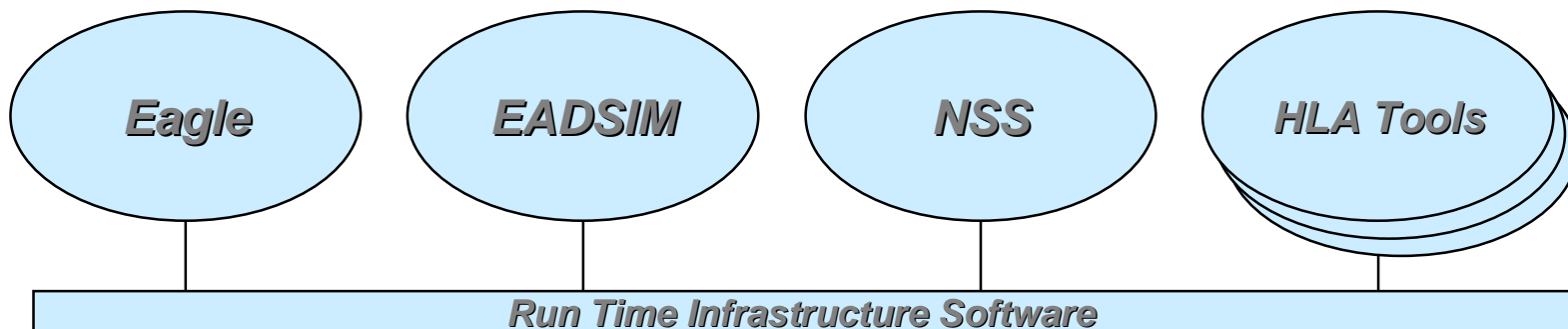
2010 JSEAD against mobile SAMs

- Adopted high priority experiment from J-6 plan¹
- J-6 LIVEX of same experiment conducted in FY98





Trailblazer Federation Composition



Federates

Eagle



SAIC
Science Applications International Corporation
An Employee-Owned Company

Extended Air Defense
Simulation



MITRE

TELEDYNE BROWN ENGINEERING
Common sense . . . uncommon innovation

Naval Simulation
System

SPAWAR



METRON

HLA Tools



Virtual Technology Corporation
Software and Systems Engineering Professionals

Functionality

Red ground clutter
Red tactical SAMs
CTOC
ATACMS

Red strategic SAMs
Air Force strike a/c
JSTARS, AWACS
JAOC

Aggregate ELINT
Infrared launch detection
Naval strike a/c

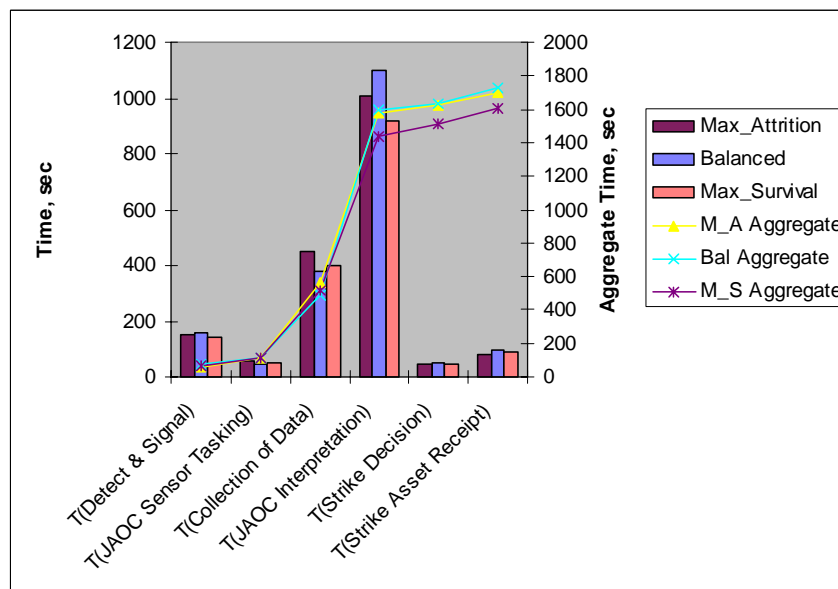
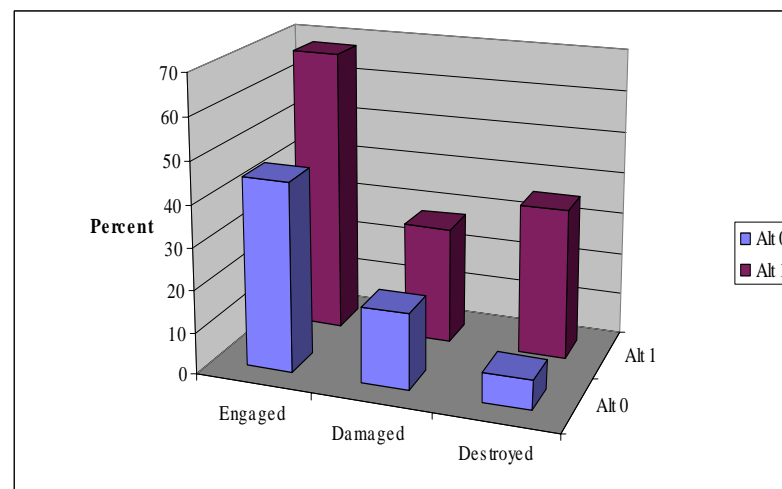
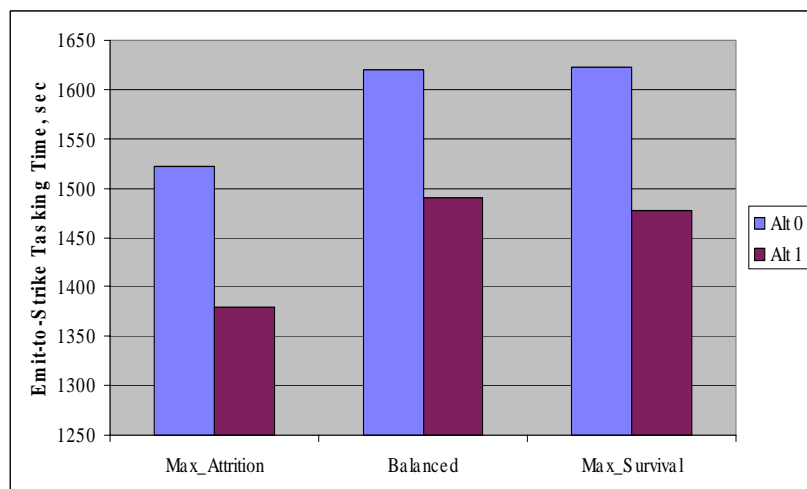
Sponsor:



Systems Engineer: **MITRE** - Washington



Prototypical Experimental Results





Summary: Federations for Joint Experimentation



- **Federations will be necessary for many joint experimentation-focused issues**
 - For experimentation, federates must have explicit and flexible representations of systems, humans, and C2 organizations
 - Flexibility can be enhanced by interfaces to other simulations, systems, or federates
- **The HLA provides the common architecture, tools, and processes to meet new requirements in a fast and cost-effective manner**
 - Use of HLA enables improved interoperability and reduces technical integration costs
 - Allows users to focus on more fundamental challenges of experimentation (e.g., problem definition, scenario development, data collection and interpretation, etc.)

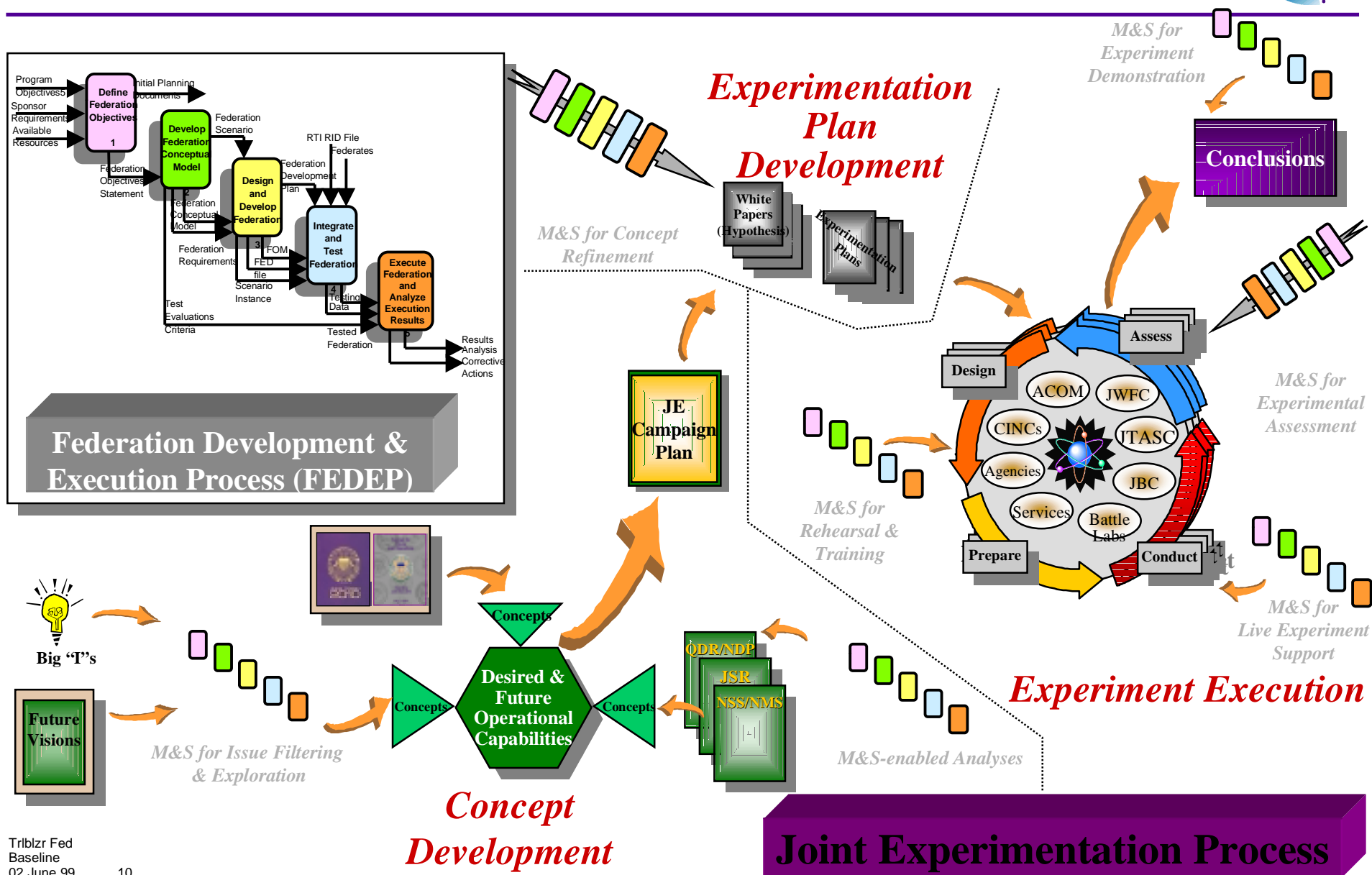


Evolution to Pegasus



- **Trailblazer effort successfully concluded by end of FY98**
 - Completed entire FEDEP including generation of prototypical analytical results
- **Project and federation re-named Pegasus in early FY99**
- **USACOM J9 has expressed interest in employing Pegasus as a tool in analysis of AOACMT**
 - Concept focus is Attack Operations Against Critical Mobile Targets in 2010 timeframe
 - Primary target set is tactical ballistic missiles (TBMs)
- **Degree of overlap between objects and interactions in current federation and AOACMT make Pegasus a particularly attractive capability**

Laying the Foundation for Joint Experimentation





The Road Ahead

- **Currently exploring technological enhancements to the FEDEP in support of the JE domain**
 - Continue to enhance the application of the HLA to JE
- **Making operational enhancements to the Pegasus federation**
 - Provide powerful, flexible analytical tool to USACOM for use in AOACMT and other emerging concepts
- **Ongoing explorations:**
 - Scenario agility
 - Common / more detailed representations
 - Performance enhancement
 - Data collection and reduction
 - Distributed classified operations
 - Multi-level operations with SCI level federates
- **Anticipate federation being ready for early FY00 operational use by USACOM J9**